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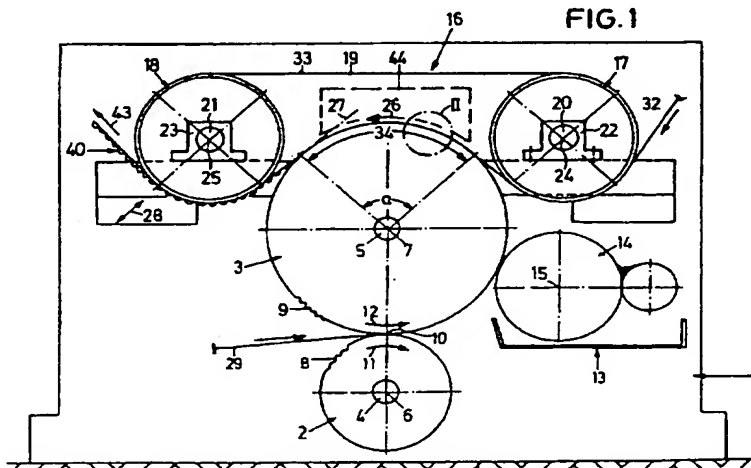
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## (54) Corrugating board: web pressing

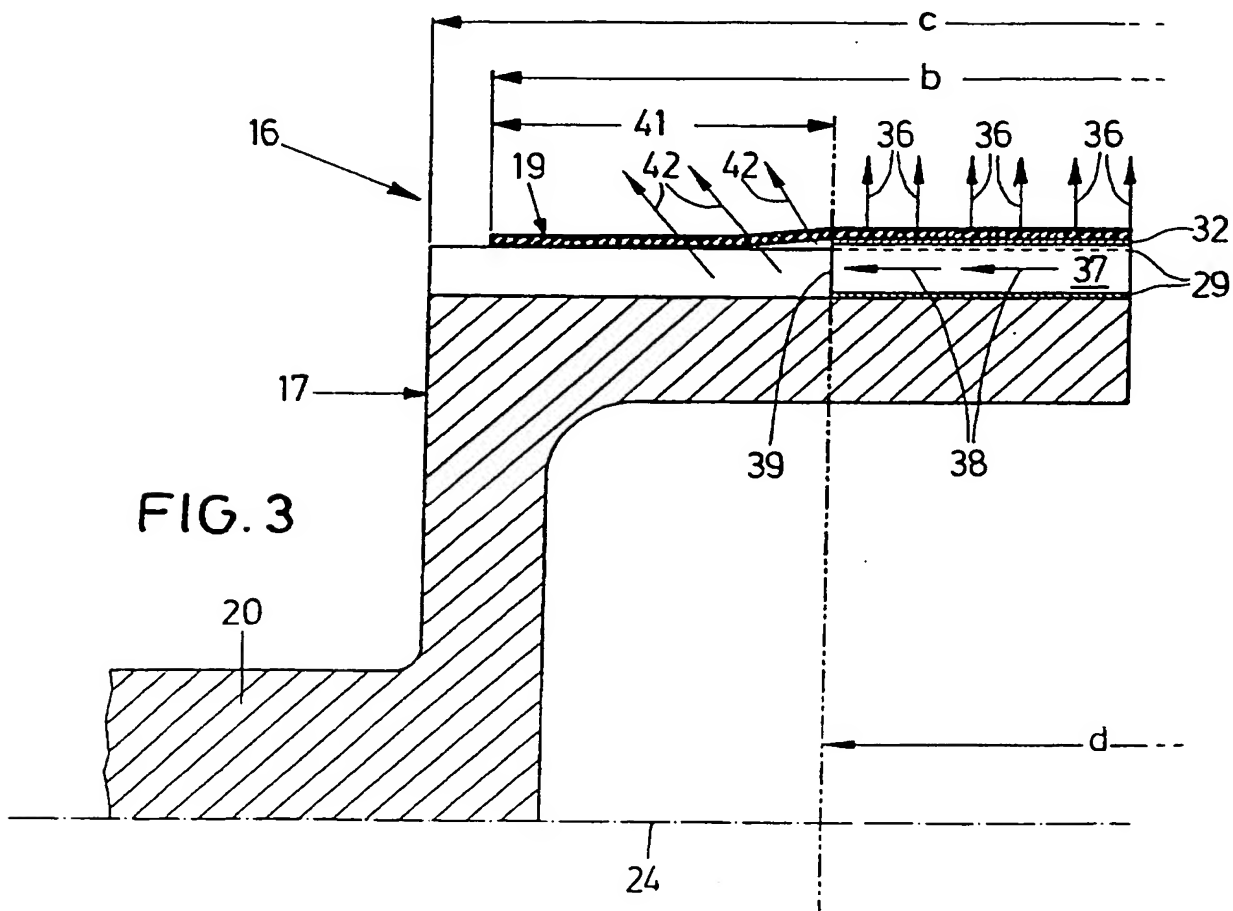
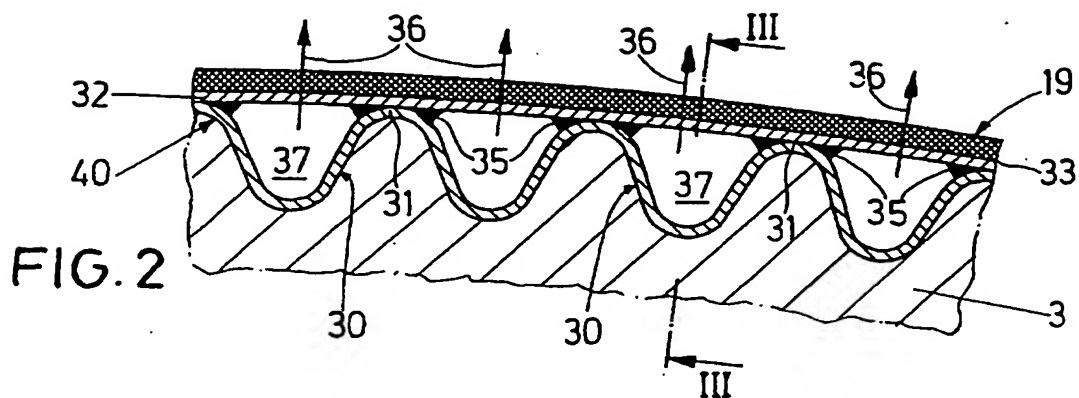
(57) A machine for the manufacture of an at least single-face lined web of corrugated board 40 comprises a pressing device 16 for pressing a liner web 32 against a glued, corrugated paper web 29. The pressing device 16 comprises a running, vapor-permeable belt 19 which is preferably screen-type in form. The belt may be of steel or plastic material, may be of woven or knitted fabric, and may have low adhesion towards the glue. The permeable belt allows vapour from the heated glue to escape. The belt may be wider than board 40 and allow vapour to escape from corrugating flutes in roll 3.



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**MACHINE FOR THE MANUFACTURE OF AN AT LEAST SINGLE-FACE LINED WEB OF CORRUGATED BOARD**

The invention relates to a machine according to the preamble of claim 1.

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A machine of the generic type is known from EP 0 492 310 A1. The webs of corrugated board produced on these machines have a width in the range of 1.20 m to 2.80 m, normally 2.50 m. In these apparatuses, binding of the glue that contains water takes place by means of heating facilities, which  
10 may be heating means of the fluted roller or separate heating means disposed above the fluted roller. Experience has shown that in particular when high-quality papers of low porosity are used for the liner web, the binding of the glue between the corrugated paper web and the liner web leaves much to be desired.

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EP 0 630 739 A1 teaches a pressing belt which consists of reinforcing fabric and a coating and which can be very thin because of its structure, thus having good thermal conductivity. It is used in particular for heat applied from outside via the pressing belt of the fluted roller. The heat is  
20 satisfactorily transferred to the paper web or the web of corrugated board. This does not solve the problem mentioned above.

It is the object of the invention to embody a machine of the generic type in such a way that a reliable connection is produced between the liner web  
25 and the corrugated paper web.

According to the invention, this object is attained by the features of the characterizing part of claim 1. The measures according to the invention en-

sure that the water vapor escaping from the glue during the heating of the paper webs can escape through the liner web and/or through the pressing belt directly on the side of the web of corrugated board produced. This provides for rapid pressure decrease in the channels formed between the corrugated paper web and the liner web so that the cross-linking under  
5 pressure of the glue may take place, which is necessary for good binding between the paper webs.

Numerous inventive developments will become apparent from the sub-  
10 claims.

Further features, advantages and details of the invention will become apparent from the ensuing description of an exemplary embodiment of the invention, taken in conjunction with the drawing, in which  
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Fig. 1 is a vertical illustration of a machine for the manufacture of a single-face lined web of corrugated board,

Fig. 2 is a partial sectional view corresponding to the detail II of Fig. 1 on  
20 a strongly enlarged scale as opposed to Fig. 1, and

Fig. 3 is a partial cross-section through the upper fluted roller along the section line III-III of Fig. 2.

25 In a machine frame 1, a lower fluted roller 2 and an upper fluted roller 3 are mounted to be rotatable by means of shafts 4, 5. They have axes 6, 7 that are parallel to each other. Their cylinder faces are provided with flutings 8, 9 which extend parallel to the axes 6, 7 and mesh in the contact area

- 10 of the two fluted rollers 2, 3. One of the fluted rollers 2, 3, usually the upper fluted roller 3, is driven in the direction of rotation 12, whereas the other fluted roller, usually the lower fluted roller 2, is driven by the other fluted roller 3 in the direction of rotation 11. A gluing device 13 is disposed  
5 in the machine frame 1 downstream of the contact area 10 in the direction of rotation 11 and 12; it has a glue-spreading roller 14 which can be set to the fluting 9 of the upper fluted roller 3. The spreading roller 14 is rotatable about an axis 15.
- 10 A pressing device 16 is provided in the upper portion of the upper fluted roller, comprising a deflection roller 17, a tensioning roller 18 and a pressing belt 19. By means of shaft journals 20 and 21, the deflection roller 17 and the tensioning roller 18 are run in bearings 22 and 23 of the machine frame 1, each freely rotatably about an axis 24 and 25, i.e. they are not  
15 driven. All the axes 6, 7, 15, 24, 25 run parallel to each other. Designs of the tensioning roller 18 are generally known, for instance from DE 44 20 726 A1 (corresponding to U.S. serial number 08/491 215). Tensioning of the pressing belt 19 takes place by displacement of the tensioning roller 18 parallel to the run-off tangent 27 in the direction 28.
- 20 As seen in Fig. 1, the pressing belt 19 rests on the fluting 9 of the upper fluted roller 3 by an angle of belt contact  $\alpha$  of approximately 90°, running in the same direction of rotation as the latter according to the arrow of direction 26. The pressing belt 19 runs off the upper fluted roller 3 according  
25 to the run-off tangent 27 which is identical with the tangent of the pressing belt 19 running on the tensioning roller 18.

The pressing belt 19 is a fine-meshed screen belt resistant to extension, the screen belt being a woven fabric or preferably a knitted fabric. It consists of steel wire or plastic cord or plastic wire, respectively, to which glue does not adhere. The screen structure of the pressing belt 19 provides for the  
5 latter to be vapor permeable.

As seen in Fig. 3, the width  $\underline{b}$  of the pressing belt 19 is only slightly smaller than the width of the deflection roller 17 and, consequently, the width of the tensioning roller 18, which is identical with the width of the deflection  
10 roller 17.

The apparatus works as follows:

A paper web 29 enters the area of contact 10 between the lower and the  
15 upper fluted roller 2, 3 and is provided with a corrugation 30 by means of the flutings 8, 9. In the glueing device 13, the peaks 31 of the respective corrugation 30 are provided with glue. No glue is spread on the other parts of the corrugated paper web 29. A liner web 32 is supplied via the deflection roller 17, the liner web 32 likewise consisting of paper and having  
20 the same width  $\underline{d}$  as the paper web 29. The width  $\underline{d}$  of the paper web 29 is smaller than the width  $\underline{b}$  of the pressing belt 19, as seen in Fig. 3. This liner web 32 is inserted, bearing against the outside of the pressing belt 19, and, in the pressing zone 34 defined by the angle of belt contact  $\underline{a}$  of the pressing belt 19, it is pressed against the peaks 31 of the corrugated paper web  
25 29, which is situated in the fluting 9 of the upper fluted roller 3, and joined to the corrugated paper web 29. The outside 33 of the pressing belt 19 presses the liner web 32 against the corrugated paper web 29.

Since the upper fluted roller 3 is usually heated for instance to a temperature of approximately 170°, the water contained in the glue 35 on the peaks 31 of the corrugation 30 evaporates and partially escapes through the liner web 32 and the screen-type pressing belt 19, as roughly outlined by the  
5 arrows of flow direction 36 in Figs. 2 and 3. This occurs in particular when comparatively light, i.e. low-grade, porous paper is used for the liner web 32. If, however, high-quality, i.e. less porous paper is used for the liner web 32, the water vapor cannot, or only to some very low extent, escape directly outwards through the liner web 32 and the pressing belt 19 in ac-  
10 cordance with the arrows of flow direction 36. Owing to the vapor pressure, slight overpressure will build up in the channels 37 formed between the corrugated paper web 29 and the liner web 32 because of the corrugation 30, it being possible that the liner web 32 is lifted off the peaks 31 of the paper web 29 as a result of this overpressure or that at least the glue 35  
15 is no longer pressed to the required extent so that there is the risk that the gluing between the liner web 32 and the peaks 31 of the paper web 29 does not become sufficiently solid. The pressure can only be decreased by a flow of water vapor and air in the direction towards the ends 39 of the channels 37 in accordance with the arrows of flow direction 38 that are  
20 parallel to the axis 24. Since the pressing belt 19 is vapor and air permeable, the vapor and the air flowing along with it, directly after leaving the channels 37, can flow off outwards through the portion 41 of the pressing belt 19 that projects beyond the web of corrugated board 40 corresponding to the arrows of flow direction 42. This effect will be the stronger, the  
25 greater the difference between the width  $b$  of the pressing belt 19 and the width  $d$  of the web of corrugated board 40. It will occur in particular when a comparatively narrow web of corrugated board 40 is produced on the machine. A machine on which to produce webs of corrugated board 40 of a



maximum width  $\underline{d}$  of 2.50 m also serves to produce webs of corrugated board of a width  $\underline{d}$  of only 1.20 m for instance. In this case, the width  $\underline{b}$  of the pressing belt 19 is approximately 2.60 m.

- 5 Together with the pressing belt 19, the finished glued web of corrugated board 40 single-face lined with a liner web 32 runs off the upper fluted roller 3 in the direction of the run-off tangent 27 and, together with the pressing belt 19, is piloted along part of the tensioning roller 18. From there, it is supplied to a take-up roller in the direction of discharge 43.
- 10 Heating of the paper webs 29, 32 need not necessarily take place via the fluted roller 3. Alternatively or facultatively, it may also take place by means of heating facilities 44 disposed within the pressing belt 19 between the deflection roller 17 and the tensioning roller 18, which is roughly
- 15 shown by dashed lines in Fig. 1.

## CLAIMS

1. A machine for the manufacture at an of least single-face lined web of corrugated board, comprising
  - 5 two fluted rollers for producing a corrugation on a paper web,
  - a gluing device for spreading glue on the peaks of the corrugation of the corrugated paper web,
  - a pressing device for pressing a liner web on the peaks, provided with glue, of the corrugated paper web which rests on one of the fluted rollers along a
  - 10 pressing zone,
  - the pressing device having a continuous pressing belt, which is guided along a deflection roller and another roller, and which is pressed against the fluted roller along the pressing zone,
  - characterized in that the pressing belt is vapor permeable at least in the
  - 15 vicinity of the web of corrugated board.
2. A machine according to claim 1, characterized in that the pressing belt is vapor permeable over its full width.
- 20 3. A machine according to claim 1 or 2, characterized in that the pressing belt is screen-type in form.
4. A machine according to one of claims 1 to 3, characterized in that the pressing belt is fine-meshed.
- 25 5. A machine according to one of claims 1 to 4, characterized in that the pressing belt is a woven or knitted fabric.

6. A machine according to one of claims 1 to 5, characterized in that the pressing belt consists of a material of low adhesion towards glue.
7. A machine according to one of claims 1 to 6, characterized in that the pressing belt consists of steel.
8. A machine according to one of claims 1 to 6, characterized in that the pressing belt consists of plastic material.
9. A machine according to one of claims 1 to 8, characterized in that the pressing belt is resistant to extension.
10. A machine according to one of claims 1 to 9, characterized in that the width of the pressing belt exceeds the maximum width of the web of corrugated board.
11. A machine for the manufacture at an of least single-face lined web of corrugated board, substantially as described herein with reference to, and as illustrated in, the accompanying drawings.



# The Patent Office

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Application No: GB 9619800.7  
Claims searched: 1-11

Examiner: Graham Werrett  
Date of search: 29 October 1996

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): D1S

Int CI (Ed.6): B31F

Other: Online: WPI

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1454729 (ESCHER) see wire screen 60 in lines 55-60 on page 4, and Figure 4.	1-3, 7.

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.